

Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220800033102

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TEST REPORT

Application No.:	FYCR2208000331HS
Applicant:	Therabody, Inc.
Address of Applicant:	6100 Wilshire Blvd. Suite 200 Los Angeles, California 90048-5107 United States
Manufacturer:	Therabody, Inc.
Address of Manufacturer:	6100 Wilshire Blvd. Suite 200 Los Angeles, CA 90048-5107, USA
Equipment Under Test (EUT):	
EUT Name:	THERAGUN mini
Model No.:	TGMINI2-02
Trade Mark:	Therabody
FCC ID:	2AU6TMINI-02
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2022-08-22
Date of Test:	2022-08-26 to 2022-09-21
Date of Issue:	2022-09-21
Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards specified above.



Winkey Wang
EMC Technical Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-09-21		Original

Authorized for issue by:			
		Tree Zhan	
		Tree Zhan/Project Engineer	
		Winkey Wang	
		Winkey Wang/Reviewer	

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

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4 General Information**4.1 Details of E.U.T.**

Power supply:	DC 5V from adapter input AC 230V/50Hz Lithium Ion Battery: 14.8V (3.7V 1200mAh*4 series connection) rechargeable battery which charged by adapter
Cable(s):	Type C cable:95cm shielded (A to C) Type C cable:100cm shielded (A+C to C)
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V4.2 LE
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	On-board PCB antenna
Antenna Gain:	-1.08dBi

Remark: The information in this section is provided by the applicant or manufacturer, CCS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Peak Output Power	± 0.8dB
Minimum 6dB Bandwidth	± 0.3%
Power Spectrum Density	± 0.4dB
Conducted Band Edges Measurement	± 2.7dB
Conducted Spurious Emissions	± 2.7dB
Radiated Emissions which fall in the restricted bands	± 4.4dB (Above 1GHz)
Radiated Spurious Emissions Below 1GHz	± 3.1dB (Below 1GHz)
Radiated Spurious Emissions Above 1GHz	± 4.4dB (Above 1GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{cispr/ETSI}$ (CISPR/ETSI Uncertainty), so the test results
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc. Shenzhen branch.

Fuyong lab. Xinlong TechnoPark, Fengtang Road, Fuyong Subdistrict, Bao'an, Shenzhen, China

Tel: +86 755 8866 3988 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 6606.01)

Compliance Certification Services (Kunshan) Inc. Shenzhen branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6606.01.

• FCC –Designation Number: CN1322

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized as an accredited testing laboratory.

Designation Number: CN1322. Test Firm Registration Number: 718073

• Innovation, Science and Economic Development Canada

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0129.

IC#: 28189.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

Minimum 6dB Bandwidth					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2022/7/12	2023/7/11
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-25	2022/5/30	2023/5/29
Signal Generator	Agilent	N5173B	SEM006-05	2022/7/12	2023/7/11
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2022/7/12	2023/7/11
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2022/7/12	2023/7/11
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2022/7/12	2023/7/11
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2022/7/12	2023/7/11
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

Power Spectrum Density					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2022/7/12	2023/7/11
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-25	2022/5/30	2023/5/29
Signal Generator	Agilent	N5173B	SEM006-05	2022/7/12	2023/7/11
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2022/7/12	2023/7/11
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2022/7/12	2023/7/11
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2022/7/12	2023/7/11
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2022/7/12	2023/7/11
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

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Conducted Band Edges Measurement					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2022/7/12	2023/7/11
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-25	2022/5/30	2023/5/29
Signal Generator	Agilent	N5173B	SEM006-05	2022/7/12	2023/7/11
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2022/7/12	2023/7/11
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2022/7/12	2023/7/11
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2022/7/12	2023/7/11
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2022/7/12	2023/7/11
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

Conducted Spurious Emissions					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2022/7/12	2023/7/11
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-25	2022/5/30	2023/5/29
Signal Generator	Agilent	N5173B	SEM006-05	2022/7/12	2023/7/11
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2022/7/12	2023/7/11
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2022/7/12	2023/7/11
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2022/7/12	2023/7/11
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2022/7/12	2023/7/11
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2022/7/12	2023/7/11
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

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Radiated Emissions which fall in the restricted bands					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer	Rohde & Schwarz	101288	SEM004-08	2022/7/12	2023/7/11
Low Noise Amplifier	CLAVIIO	BDLNA-0118-352810	SEM005-05	2022/7/12	2023/7/11
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022/7/12	2023/7/11
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2022/7/12	2023/7/11
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

Radiated Spurious Emissions Below 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

Radiated Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date



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3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer	Rohde & Schwarz	101288	SEM004-08	2022/7/12	2023/7/11
Low Noise Amplifier	CLAVIIO	BDLNA-0118-352810	SEM005-05	2022/7/12	2023/7/11
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022/7/12	2023/7/11
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2022/7/12	2023/7/11
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

General used equipment

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-22	2022-07-12	2023-07-11
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-23	2022-07-12	2023-07-11
Barometer	DUMAI	DYM3	SEM002-24	2022-07-12	2023-07-11

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -1.08dBi.

Antenna location: Refer to internal photo.

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7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 46.4 % RH Atmospheric Pressure: 1020 mbar

7.1.1 Test Mode Description

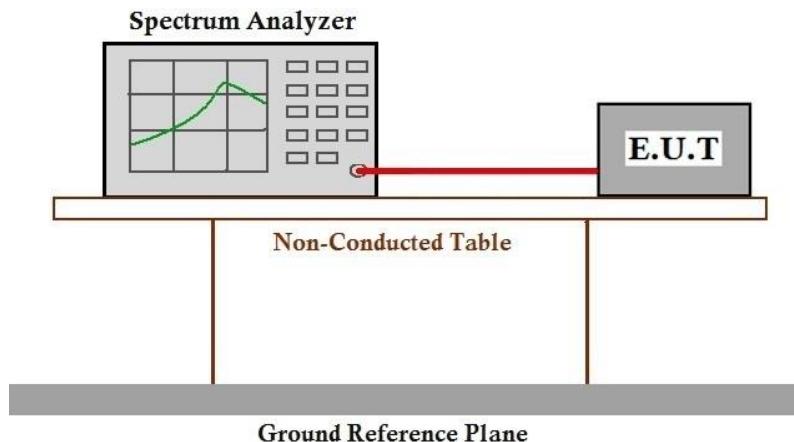
Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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7.1.2 Test Setup Diagram**7.1.3 Measurement Procedure and Data**

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details



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7.2 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)

Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit:

≥500 kHz

7.2.1 E.U.T. Operation

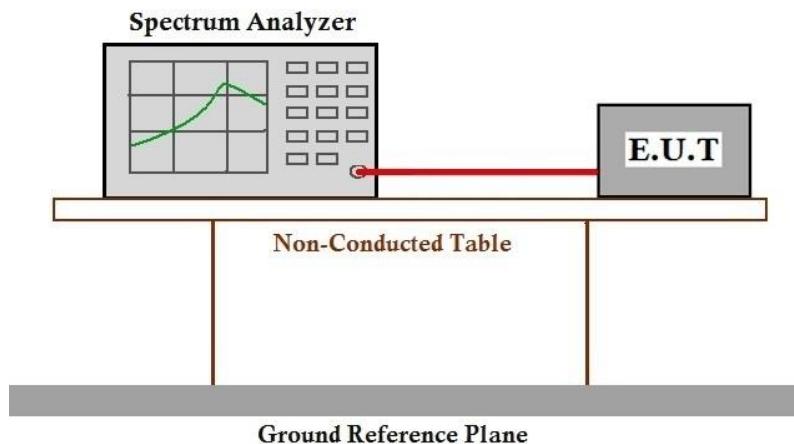
Operating Environment:

Temperature: 25.1 °C Humidity: 46.4 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.3 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)

Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

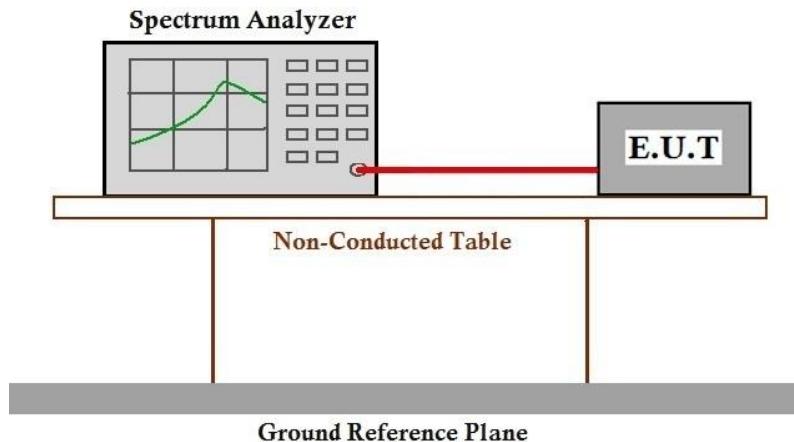
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 46.4 % RH Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram**7.3.4 Measurement Procedure and Data**

Please Refer to Appendix for Details



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7.4 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

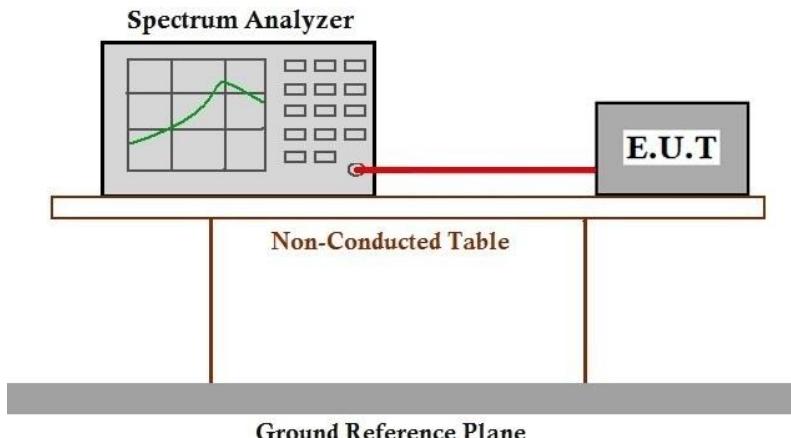
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 46.4 % RH Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram

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7.4.4 Measurement Procedure and Data

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7.5 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.11

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

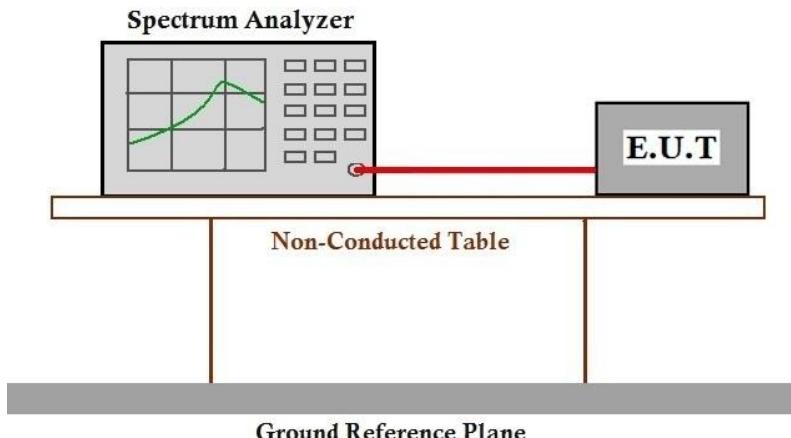
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 46.4 % RH Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.3 Test Setup Diagram

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7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.6 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1020 mbar

7.6.2 Test Mode Description

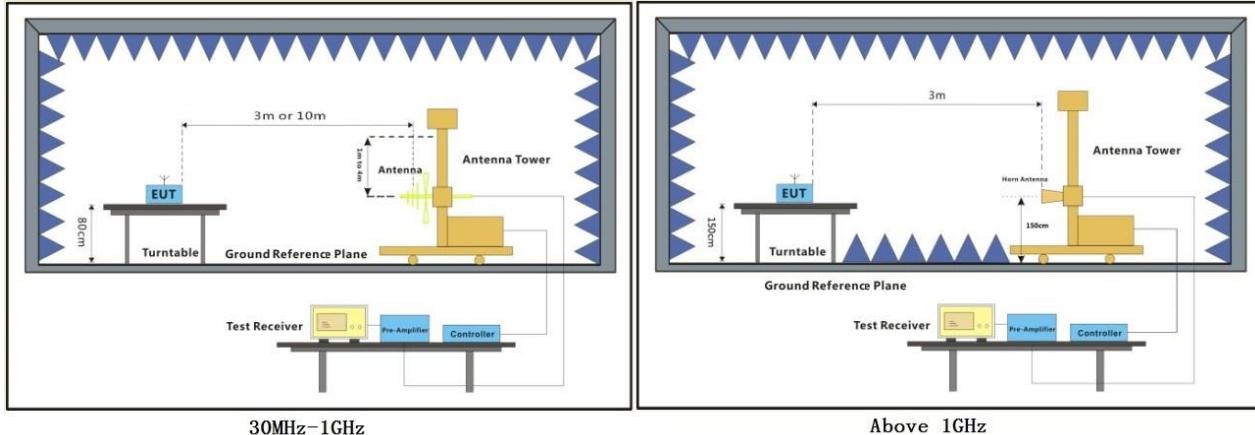
Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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7.6.3 Test Setup Diagram**7.6.4 Measurement Procedure and Data**

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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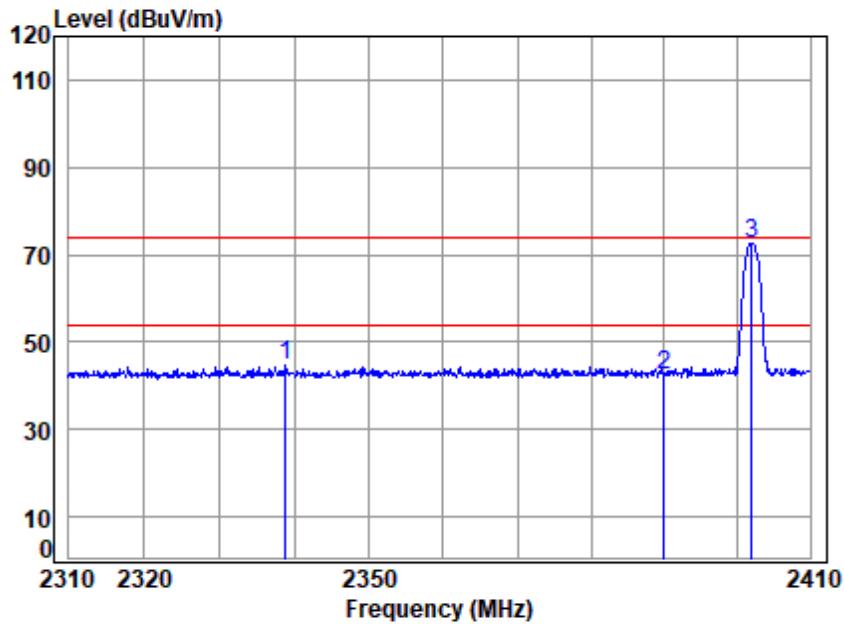
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 00331HS\00332HS

Mode : 2402 Band edge

Note : BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								dB	
MHz									
1 2338.862	4.20	28.56	35.23	47.02	44.55	74.00	-29.45	peak	
2 2390.000	4.25	28.76	35.21	44.72	42.52	74.00	-31.48	peak	
3 2402.000	4.26	28.81	35.20	74.77	72.64	74.00	-1.36	peak	

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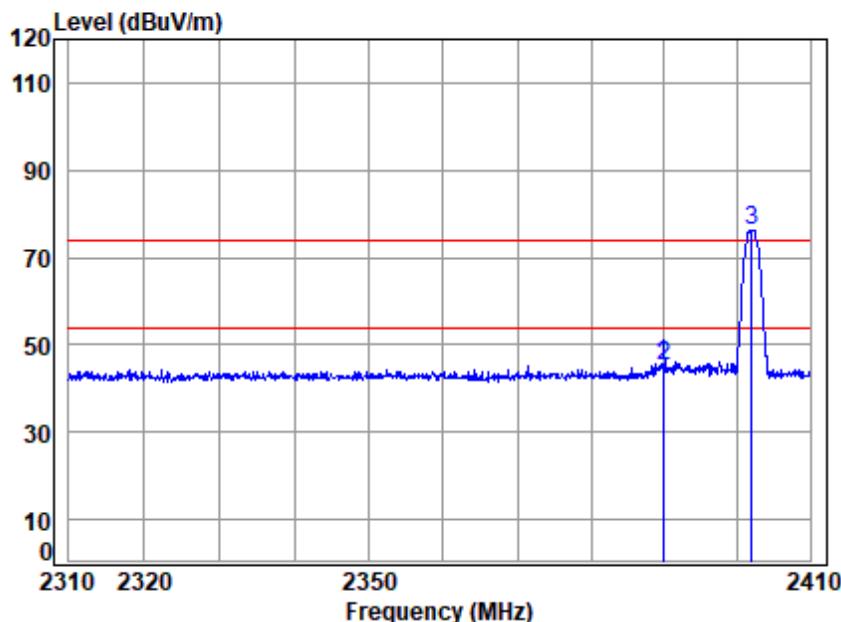
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No : 00331HS\00332HS

Mode : 2402 Band edge

Note : BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read	Limit Line	Over Limit	Remark
				Level			
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2389.862	4.25	28.76	35.21	47.87	45.67	74.00	-28.33 peak
2 2390.000	4.25	28.76	35.21	47.41	45.21	74.00	-28.79 peak
3 . 2402.000	4.26	28.81	35.20	78.49	76.36	74.00	2.36 peak

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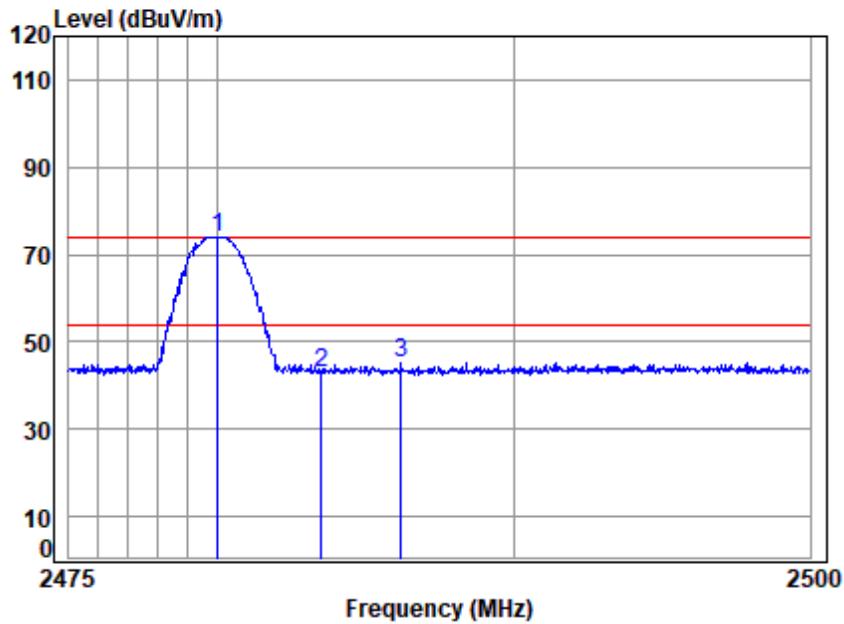
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 00331HS\00332HS

Mode : 2480 Band edge

Note : BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								dB	
MHz									
1 . 2480.000	4.34	29.28	35.17	75.62	74.07	74.00	0.07	peak	
2 2483.500	4.34	29.30	35.17	44.50	42.97	74.00	-31.03	peak	
3 2486.169	4.35	29.32	35.16	46.74	45.25	74.00	-28.75	peak	



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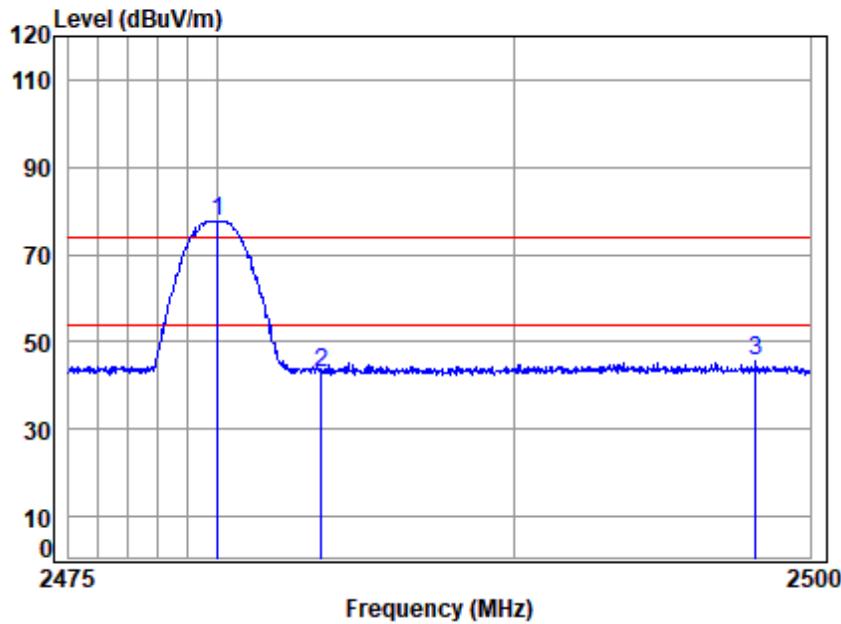
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m VERTICAL

Job No : 00331HS\00332HS

Mode : 2480 Band edge

Note : BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								dB	
MHz									
1 . 2480.000	4.34	29.28	35.17	79.28	77.73	74.00	3.73	peak	
2 2483.500	4.34	29.30	35.17	44.51	42.98	74.00	-31.02	peak	
3 2498.167	4.36	29.39	35.16	46.86	45.45	74.00	-28.55	peak	

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7.7 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22.3 °C Humidity: 51.6 % RH Atmospheric Pressure: 1020 mbar

7.7.2 Test Mode Description

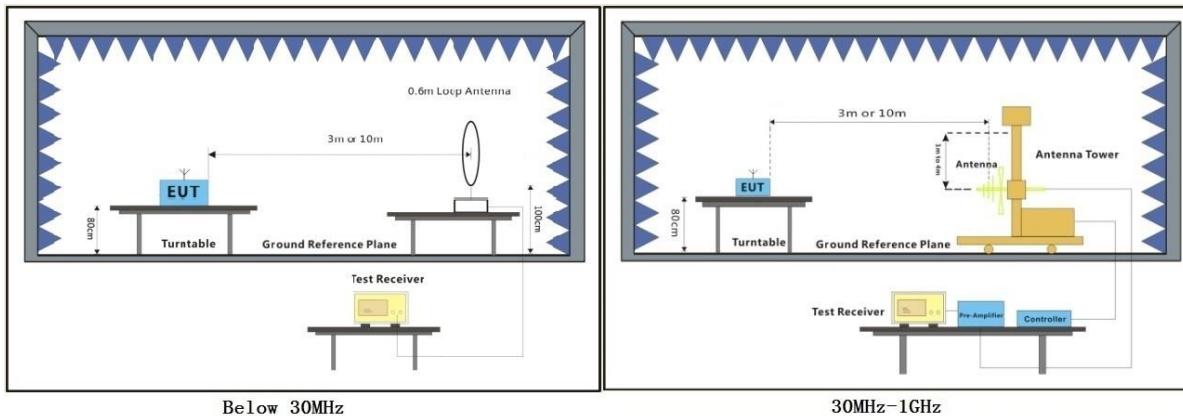
Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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7.7.3 Test Setup Diagram**7.7.4 Measurement Procedure and Data**

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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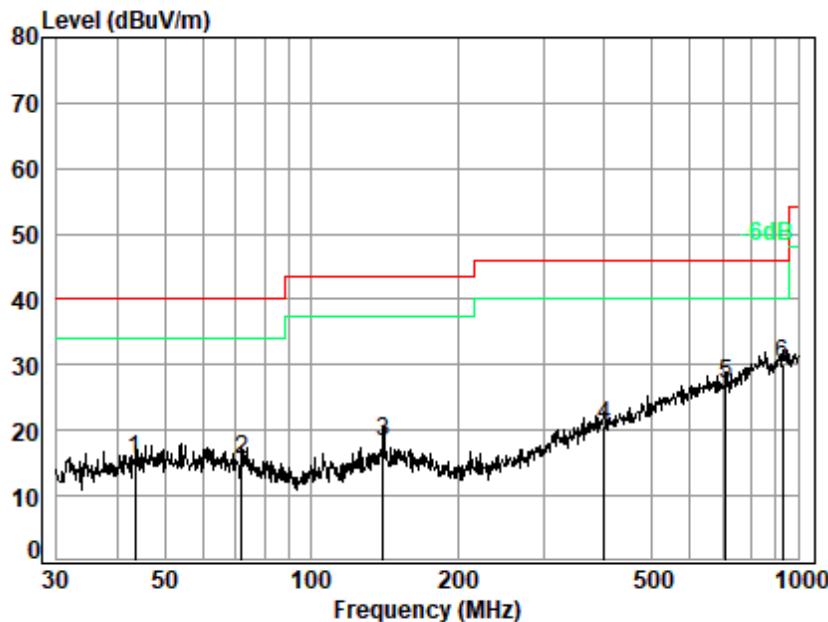
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Test Mode: 00; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00331HS
Mode : 00

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over	
							dB	Remark
1 43.5057	0.21	17.27	24.93	22.99	15.54	40.00	-24.46	QP
2 71.8320	0.32	15.42	24.82	24.53	15.45	40.00	-24.55	QP
3 140.3421	0.91	17.44	25.53	25.42	18.24	43.50	-25.26	QP
4 399.0302	1.71	20.68	25.66	23.94	20.67	46.00	-25.33	QP
5 709.1823	1.71	25.86	25.70	25.11	26.98	46.00	-19.02	QP
6 929.0082	2.16	29.06	25.50	24.44	30.16	46.00	-15.84	QP

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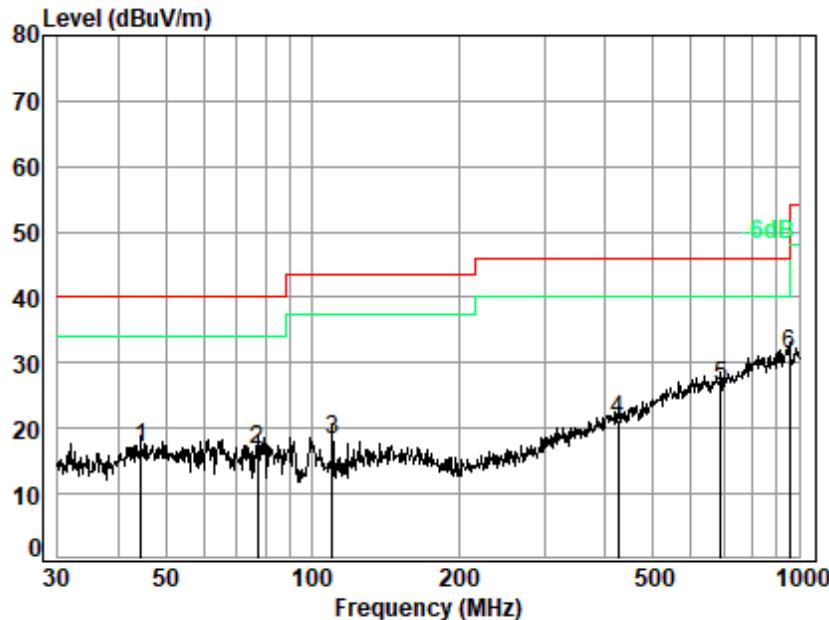
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Test Mode: 00; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No : 00331HS
Mode : 00

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over	
							dB	Remark
1 44.4308	0.21	17.29	24.92	24.39	16.97	40.00	-23.03	QP
2 77.3212	0.40	14.50	24.81	26.63	16.72	40.00	-23.28	QP
3 110.1816	0.89	15.22	25.51	27.63	18.23	43.50	-25.27	QP
4 425.0280	1.57	21.15	25.67	24.37	21.42	46.00	-24.58	QP
5 691.9867	1.72	25.63	25.70	24.79	26.44	46.00	-19.56	QP
6 955.4382	2.13	29.30	25.46	25.33	31.30	46.00	-14.70	QP

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7.8 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

7.8.1 E.U.T. Operation

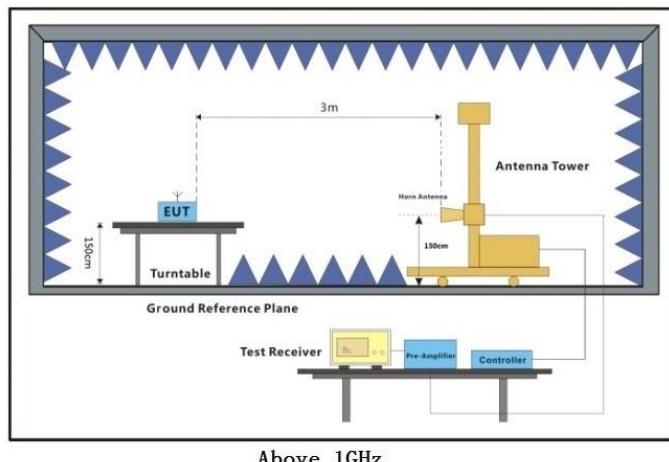
Operating Environment:

Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1020 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Test Setup Diagram



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7.8.4 Measurement Procedure and Data

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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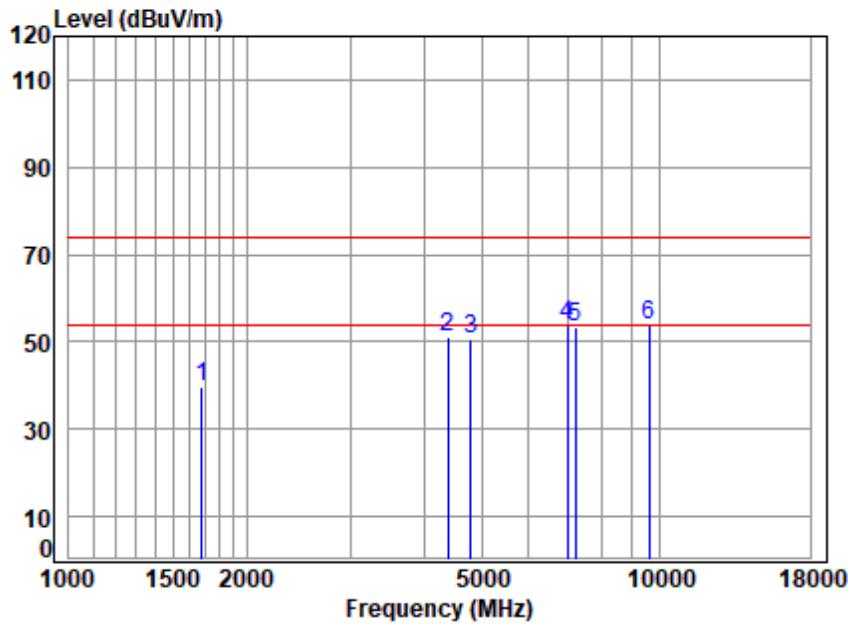
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00331HS\00332HS
Mode : 2402 TX RSE
: BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								dB	
MHz									
1	1682.477	3.47	26.77	36.08	45.64	39.80	74.00	-34.20	peak
2	4379.699	6.66	33.54	34.55	45.45	51.10	74.00	-22.90	peak
3	4804.000	7.04	33.82	34.43	44.01	50.44	74.00	-23.56	peak
4	6995.172	8.32	35.79	35.39	45.13	53.85	74.00	-20.15	peak
5	7206.000	8.52	35.80	35.44	44.39	53.27	74.00	-20.73	peak
6	9608.000	10.39	37.10	35.14	41.48	53.83	74.00	-20.17	peak

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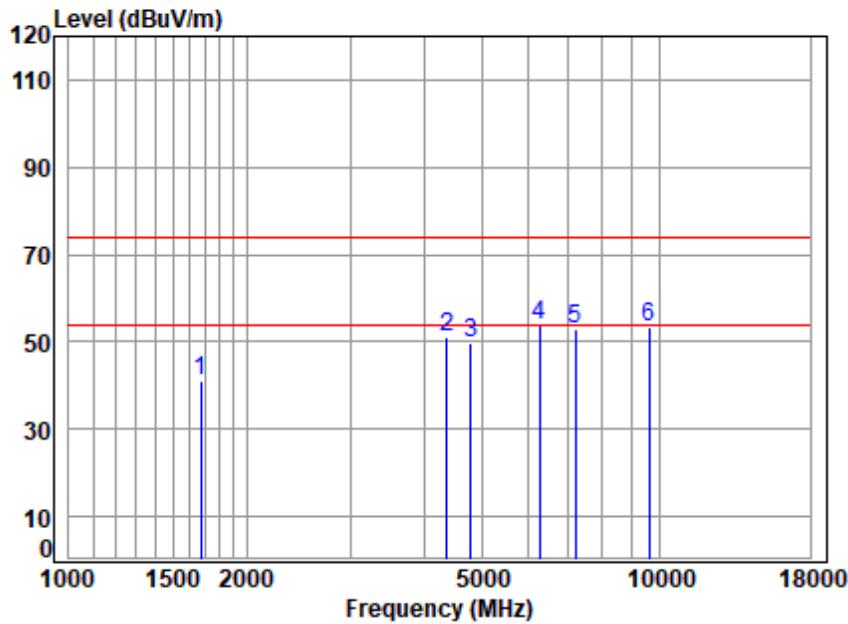
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No : 00331HS\00332HS

Mode : 2402 TX RSE

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit

	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	1672.779	3.46	26.75	36.10	46.86	40.97	74.00	-33.03 peak
2	4367.058	6.65	33.57	34.55	45.22	50.89	74.00	-23.11 peak
3	4804.000	7.04	33.82	34.43	43.48	49.91	74.00	-24.09 peak
4	6267.553	8.21	35.20	34.84	45.25	53.82	74.00	-20.18 peak
5	7206.000	8.52	35.80	35.44	43.93	52.81	74.00	-21.19 peak
6	9608.000	10.39	37.10	35.14	41.25	53.60	74.00	-20.40 peak

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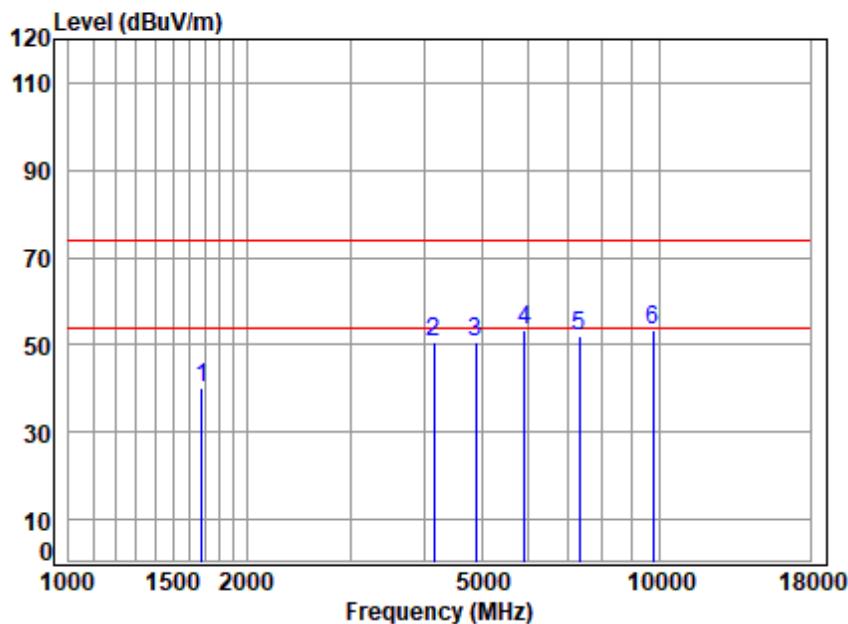
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00331HS\00332HS
Mode : 2440 TX RSE
: BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								MHz	dB
1	1677.621	3.46	26.76	36.09	45.82	39.95	74.00	-34.05	peak
2	4157.664	6.44	33.15	34.61	45.77	50.75	74.00	-23.25	peak
3	4880.000	7.11	34.06	34.41	43.85	50.61	74.00	-23.39	peak
4	5915.516	8.09	34.83	34.60	45.28	53.60	74.00	-20.40	peak
5	7320.000	8.62	35.90	35.46	42.88	51.94	74.00	-22.06	peak
6	9760.000	10.45	37.20	35.17	40.97	53.45	74.00	-20.55	peak

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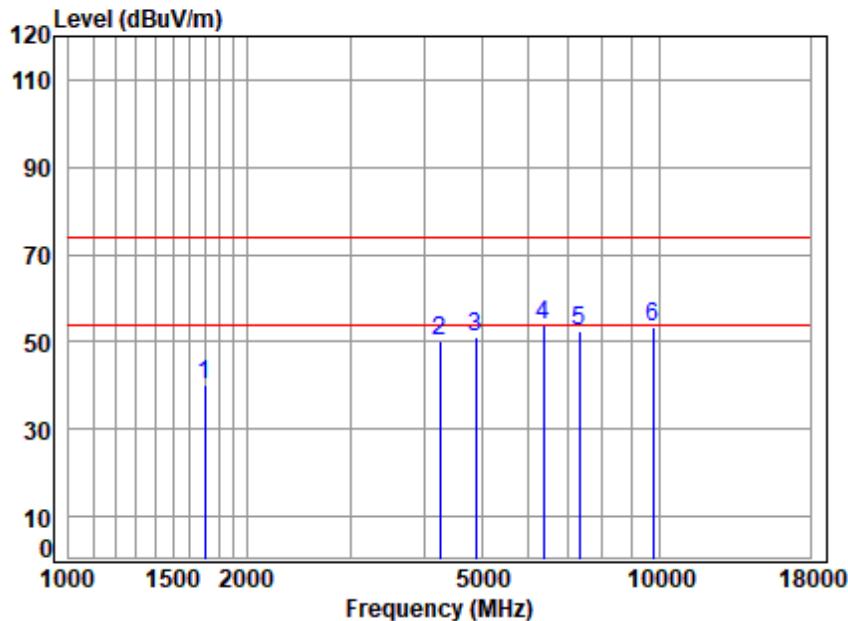
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m VERTICAL

Job No : 00331HS\00332HS

Mode : 2440 TX RSE

	Cable Freq	Ant Loss	Preamp Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
--	---------------	-------------	------------------	---------------	----------------	--------------	---------------	--------

	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	1702.042	3.49	26.80	36.03	46.10	40.36	74.00	-33.64 peak
2	4254.921	6.54	33.60	34.58	44.84	50.40	74.00	-23.60 peak
3	4880.000	7.11	34.06	34.41	44.33	51.09	74.00	-22.91 peak
4	6358.789	8.22	35.22	34.91	45.14	53.67	74.00	-20.33 peak
5	7320.000	8.62	35.90	35.46	43.30	52.36	74.00	-21.64 peak
6	9760.000	10.45	37.20	35.17	41.10	53.58	74.00	-20.42 peak

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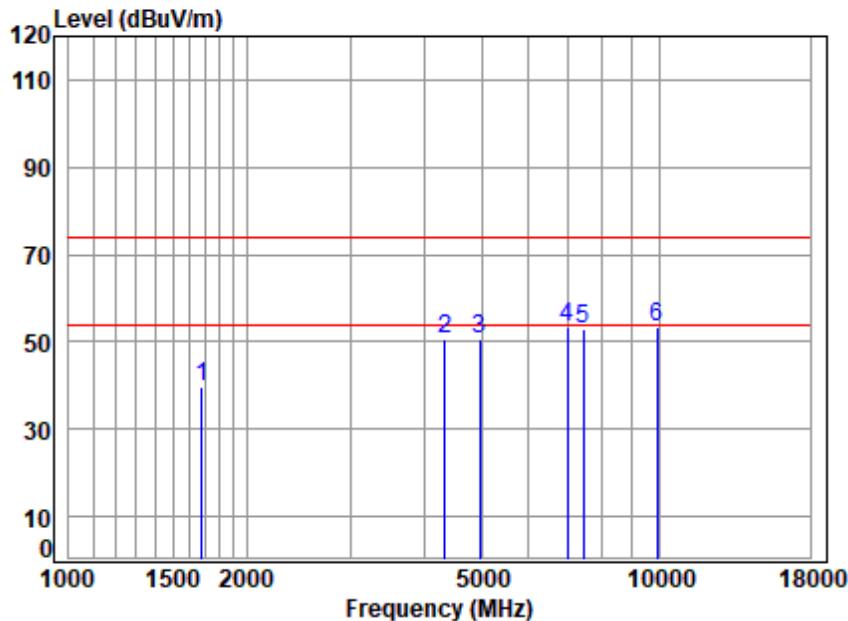
Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220800033102

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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00331HS\00332HS
Mode : 2480 TX RSE
: BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								MHz	dB
1	1677.621	3.46	26.76	36.09	45.68	39.81	74.00	-34.19	peak
2	4341.886	6.62	33.60	34.56	44.97	50.63	74.00	-23.37	peak
3	4960.000	7.18	34.22	34.39	43.71	50.72	74.00	-23.28	peak
4	6974.982	8.32	35.75	35.37	44.90	53.60	74.00	-20.40	peak
5	7440.000	8.73	35.90	35.49	43.85	52.99	74.00	-21.01	peak
6	9920.000	10.52	37.30	35.20	40.95	53.57	74.00	-20.43	peak

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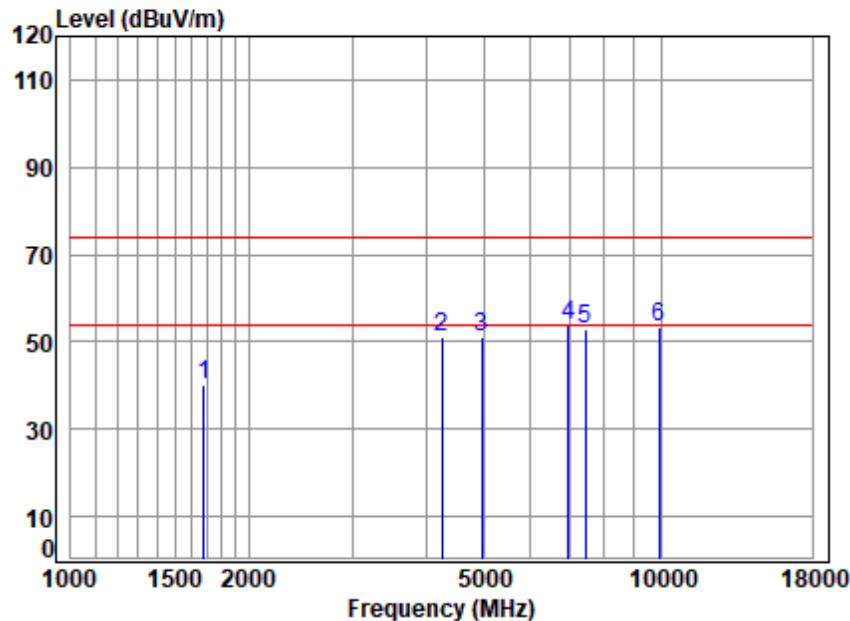
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220800033102

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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00331HS\00332HS
Mode : 2480 TX RSE
: BLE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								dB	
MHz									
1	1682.477	3.47	26.77	36.08	45.82	39.98	74.00	-34.02	peak
2	4254.921	6.54	33.60	34.58	45.51	51.07	74.00	-22.93	peak
3	4960.000	7.18	34.22	34.39	43.99	51.00	74.00	-23.00	peak
4	6954.852	8.31	35.71	35.36	45.02	53.68	74.00	-20.32	peak
5	7440.000	8.73	35.90	35.49	43.74	52.88	74.00	-21.12	peak
6	9920.000	10.52	37.30	35.20	40.68	53.30	74.00	-20.70	peak

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8 Test Setup Photo

Refer to Setup Photos for FYCR2208000331HS

9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for FYCR2208000331HS

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10 Appendix

1. Duty Cycle

1.1 Ant1

1.1.1 Test Result

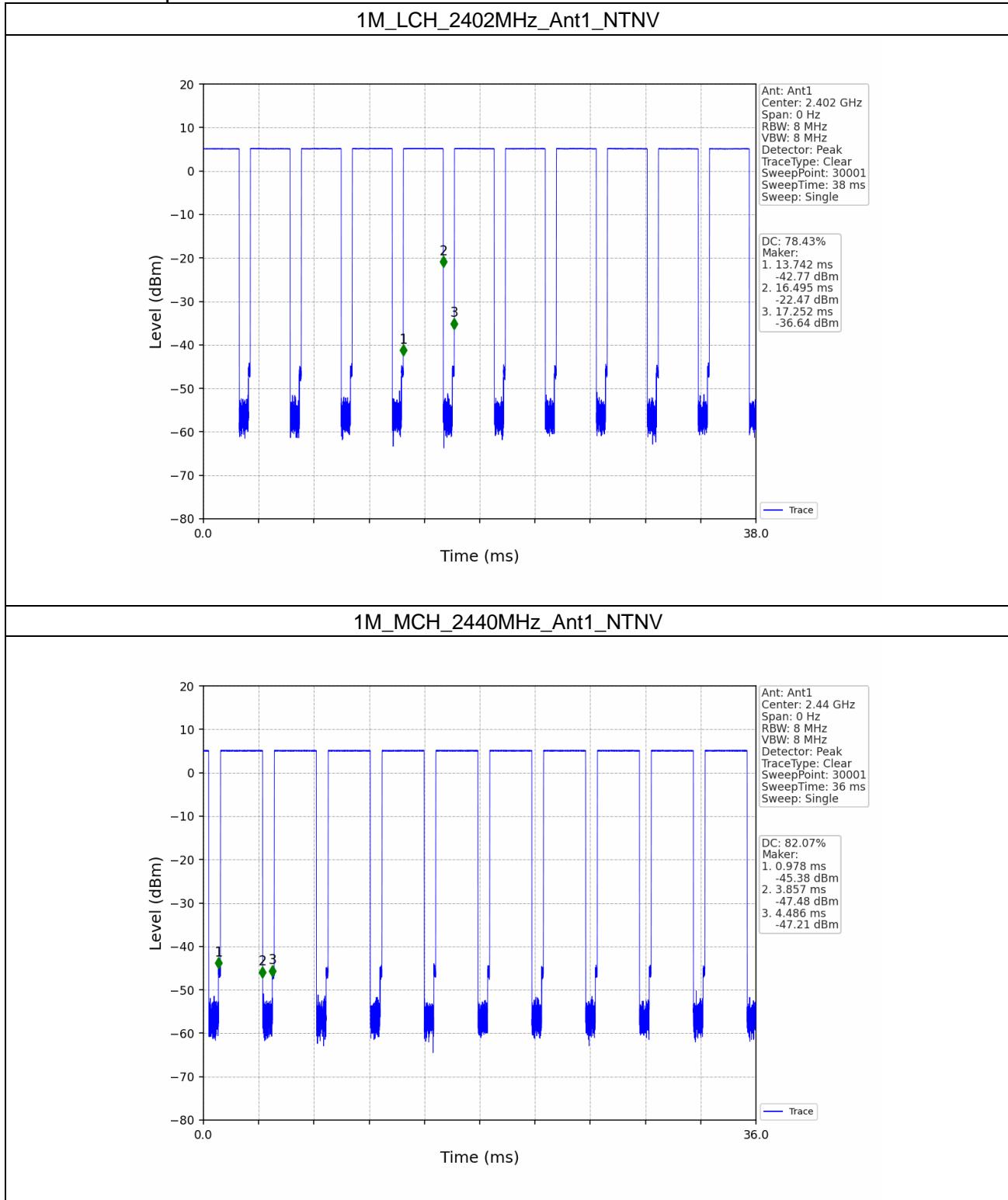
Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	2.753	3.510	78.43	1.06	0.06
		2440	2.879	3.508	82.07	0.86	0.03
		2480	2.753	3.509	78.46	1.05	0.03



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1.1.2 Test Graph


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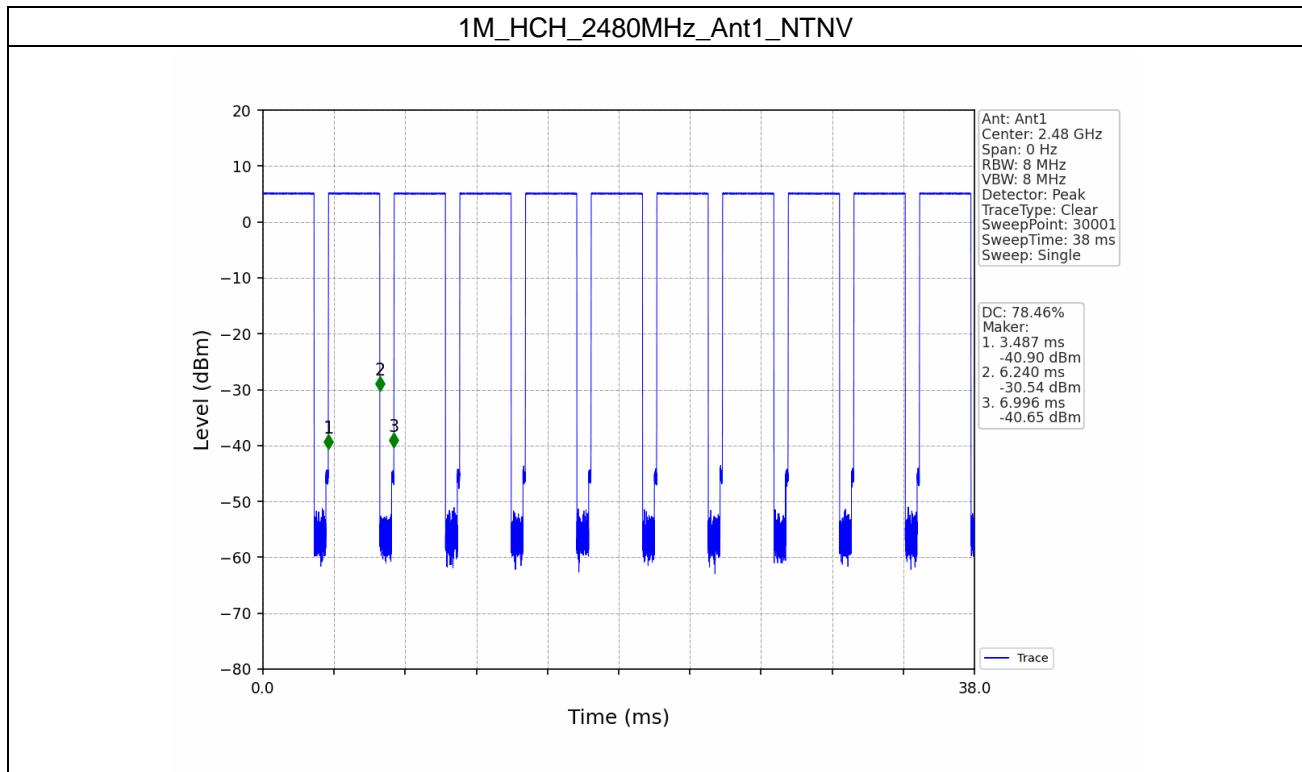
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2. Bandwidth**2.1 OBW****2.1.1 Test Result**

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	1.003	Pass
		2440	1	1.160	Pass
		2480	1	1.143	Pass

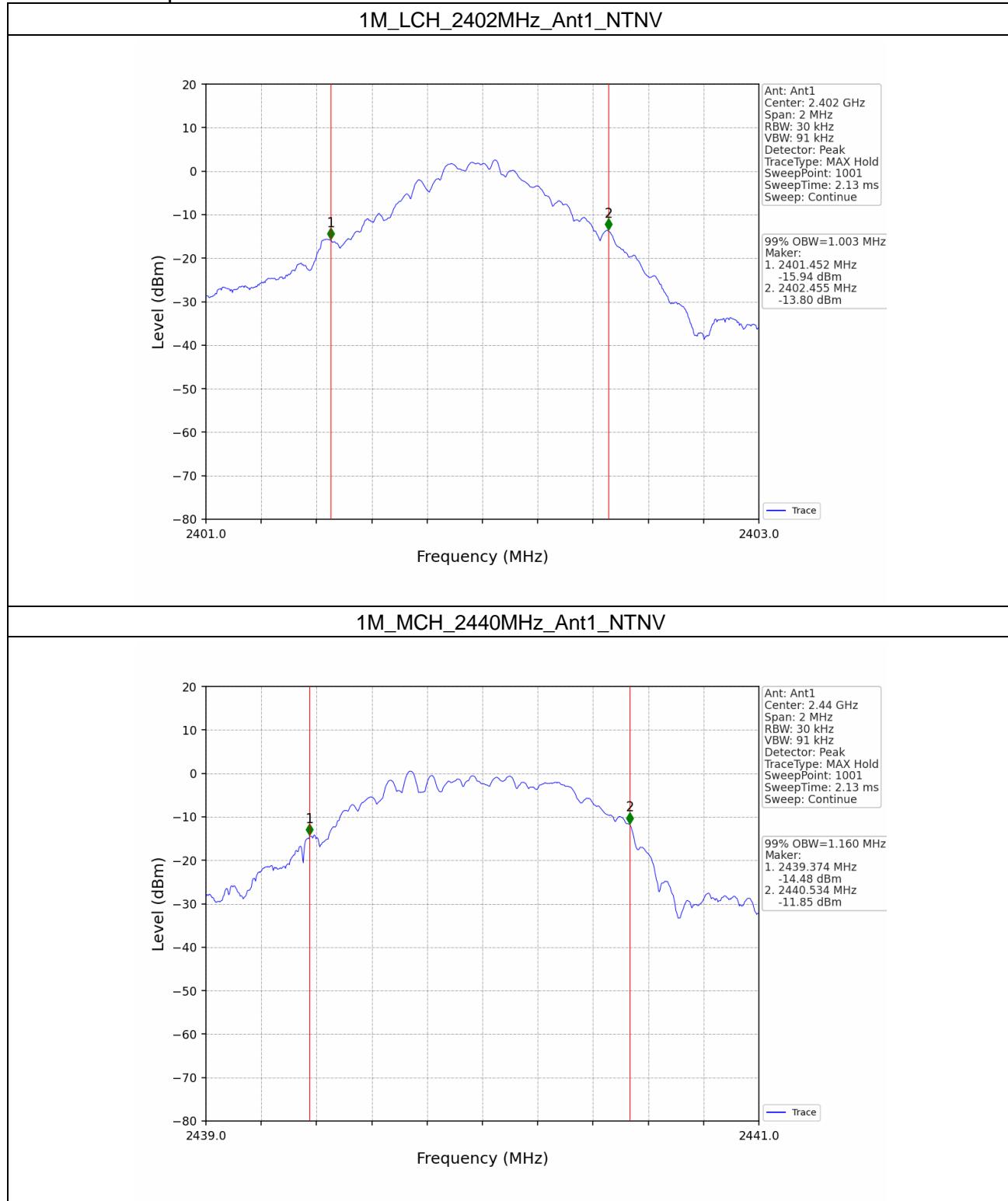


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2.1.2 Test Graph

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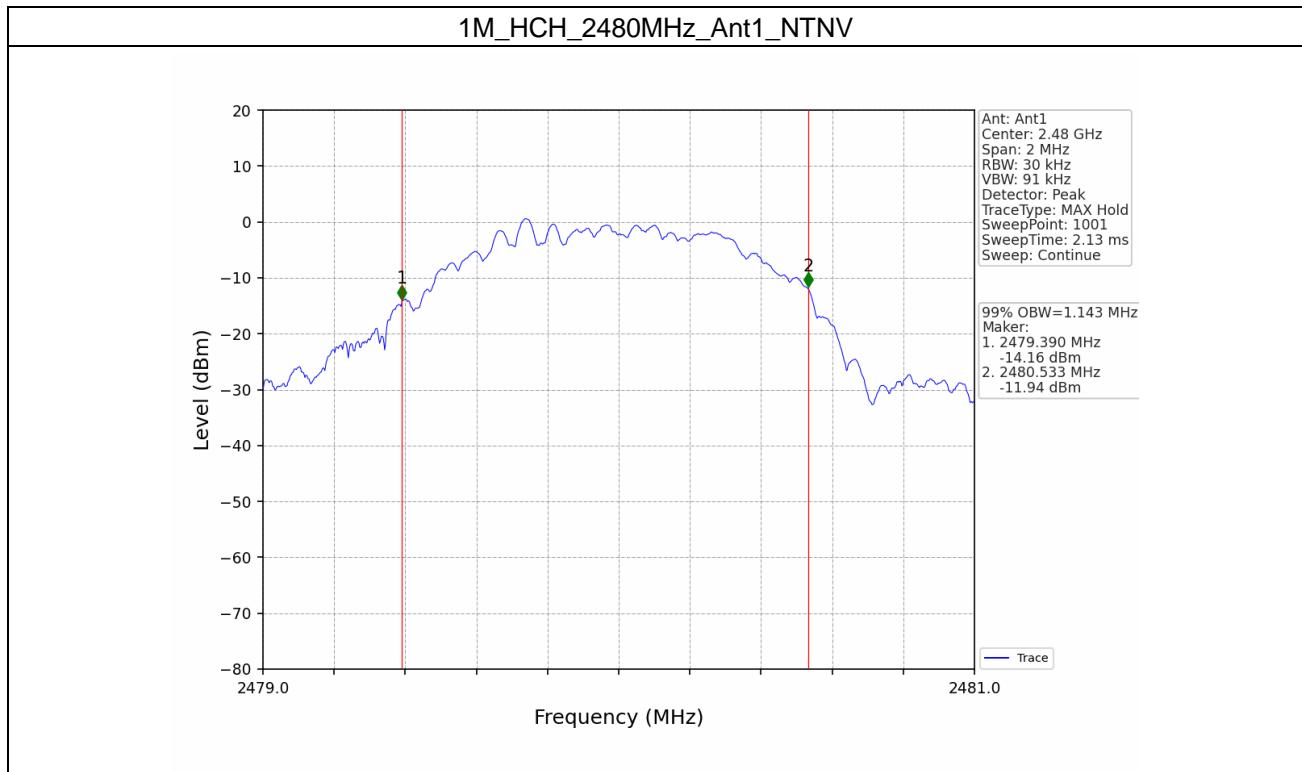
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2.2 6dB BW**2.2.1 Test Result**

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.536	>=0.5	Pass
		2440	1	0.798	>=0.5	Pass
		2480	1	0.798	>=0.5	Pass

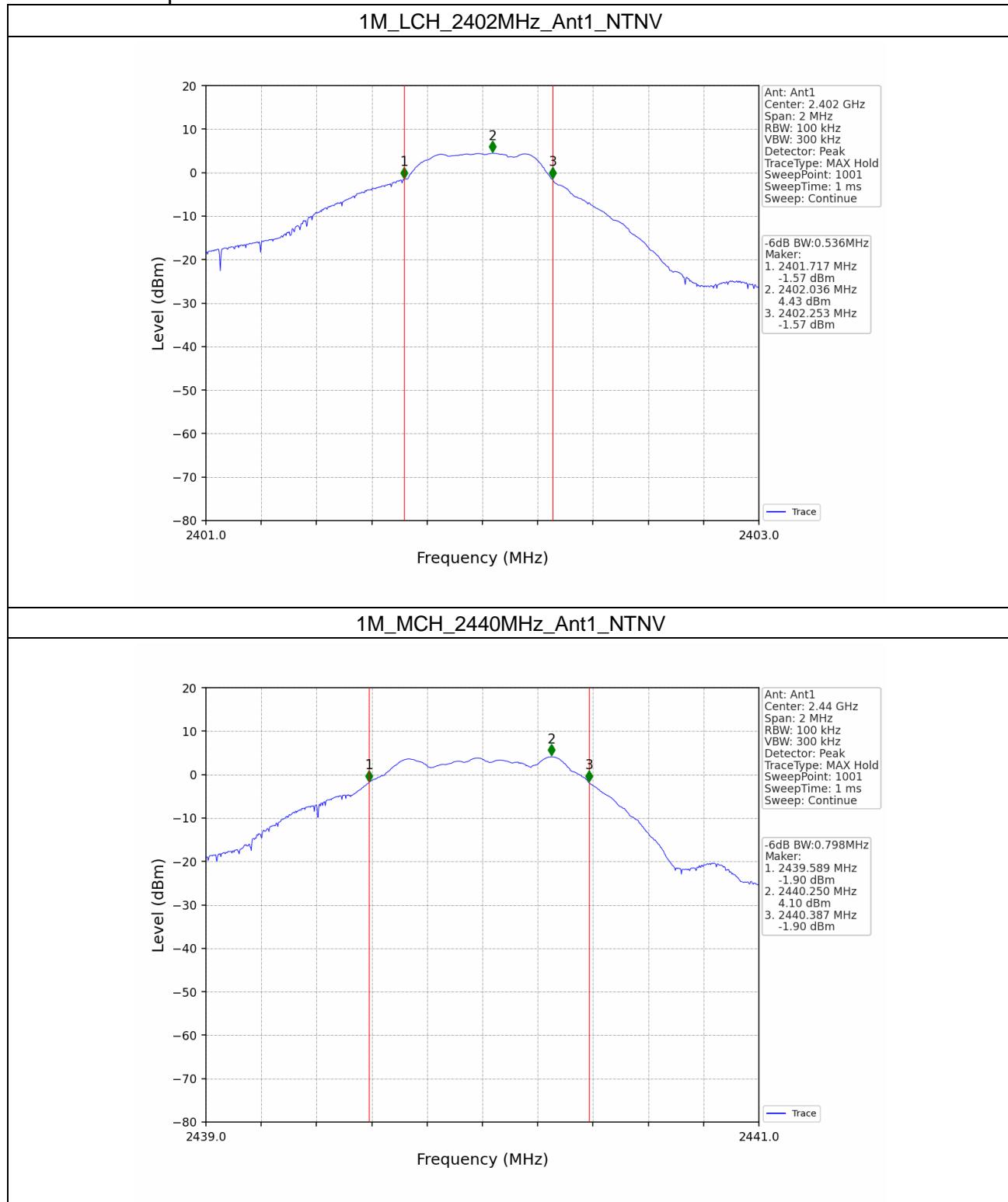


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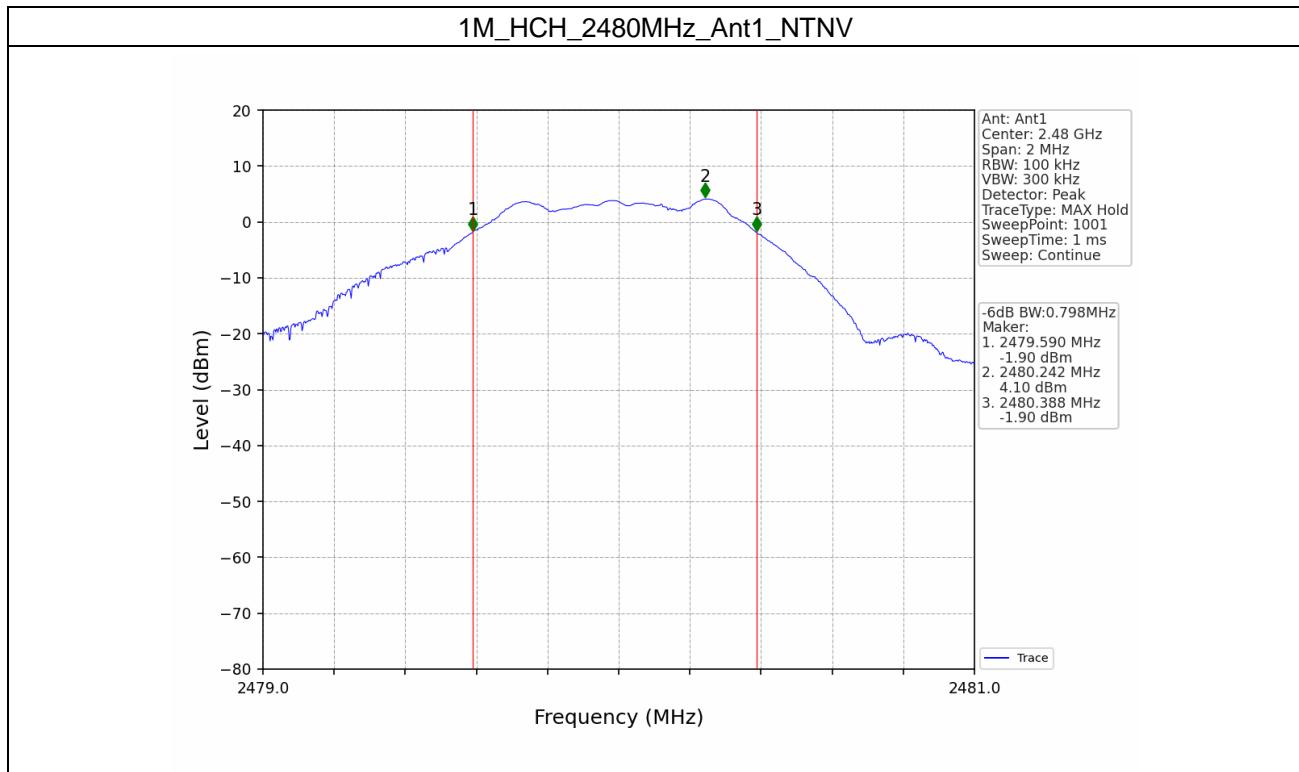
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3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	-1.39	<=30	Pass
		2440	-1.25	<=30	Pass
		2480	-1.02	<=30	Pass

4. Maximum Power Spectral Density

4.1 PSD

4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-18.42	<=8	Pass
		2440	-18.38	<=8	Pass
		2480	-18.04	<=8	Pass

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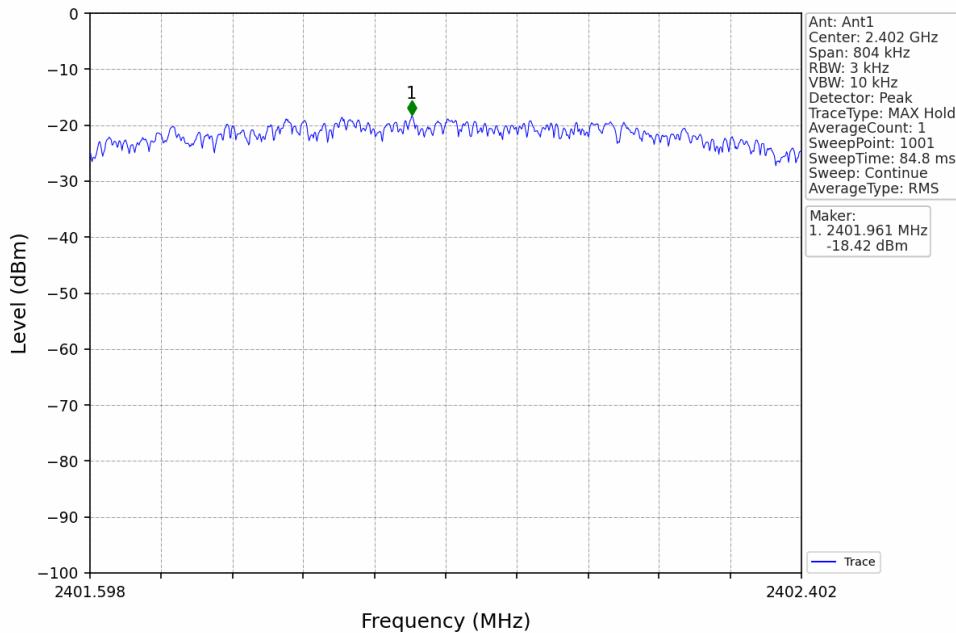
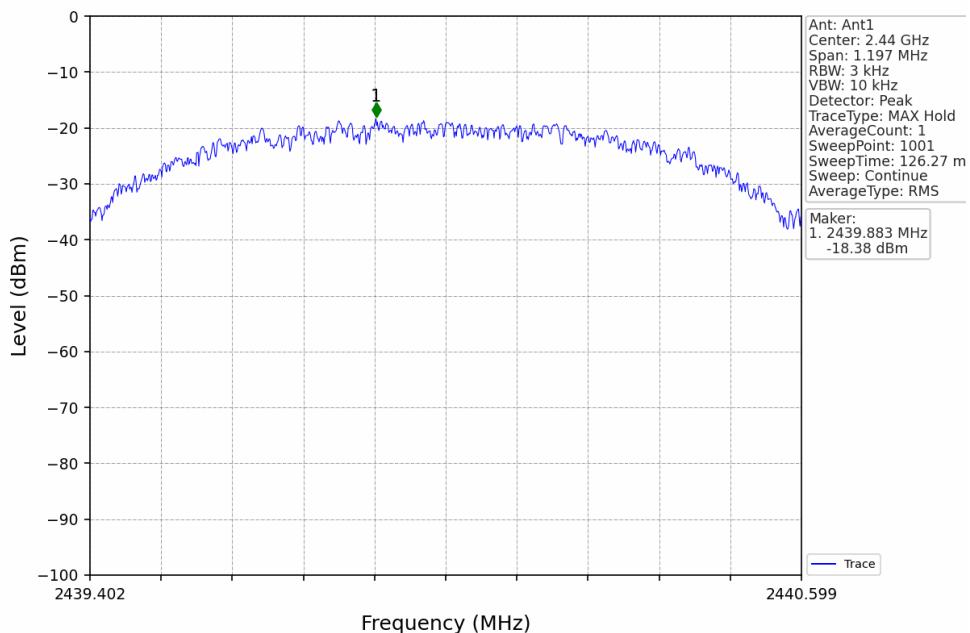


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4.1.2 Test Graph**1M_LCH_2402MHz_Ant1_NTNV****1M_MCH_2440MHz_Ant1_NTNV**

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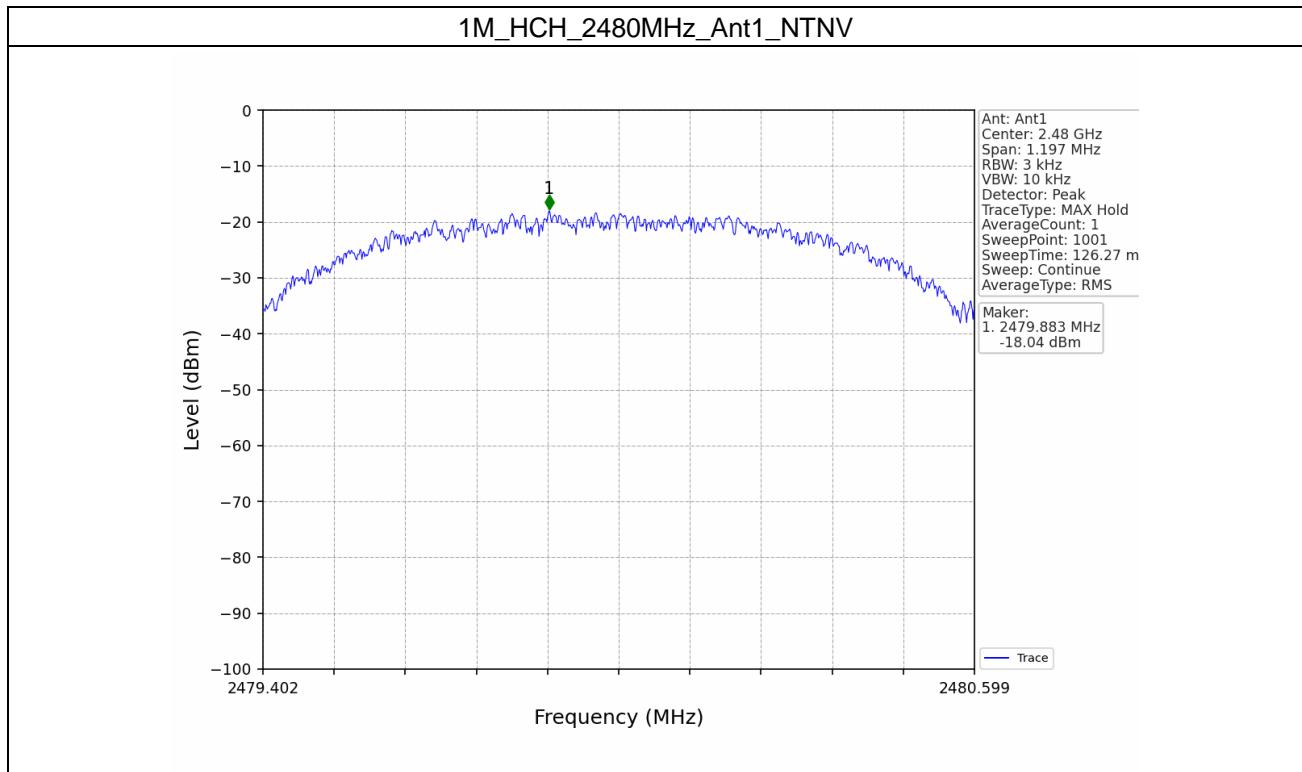
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5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	-1.40
		2440	1	-1.25
		2480	1	-1.02

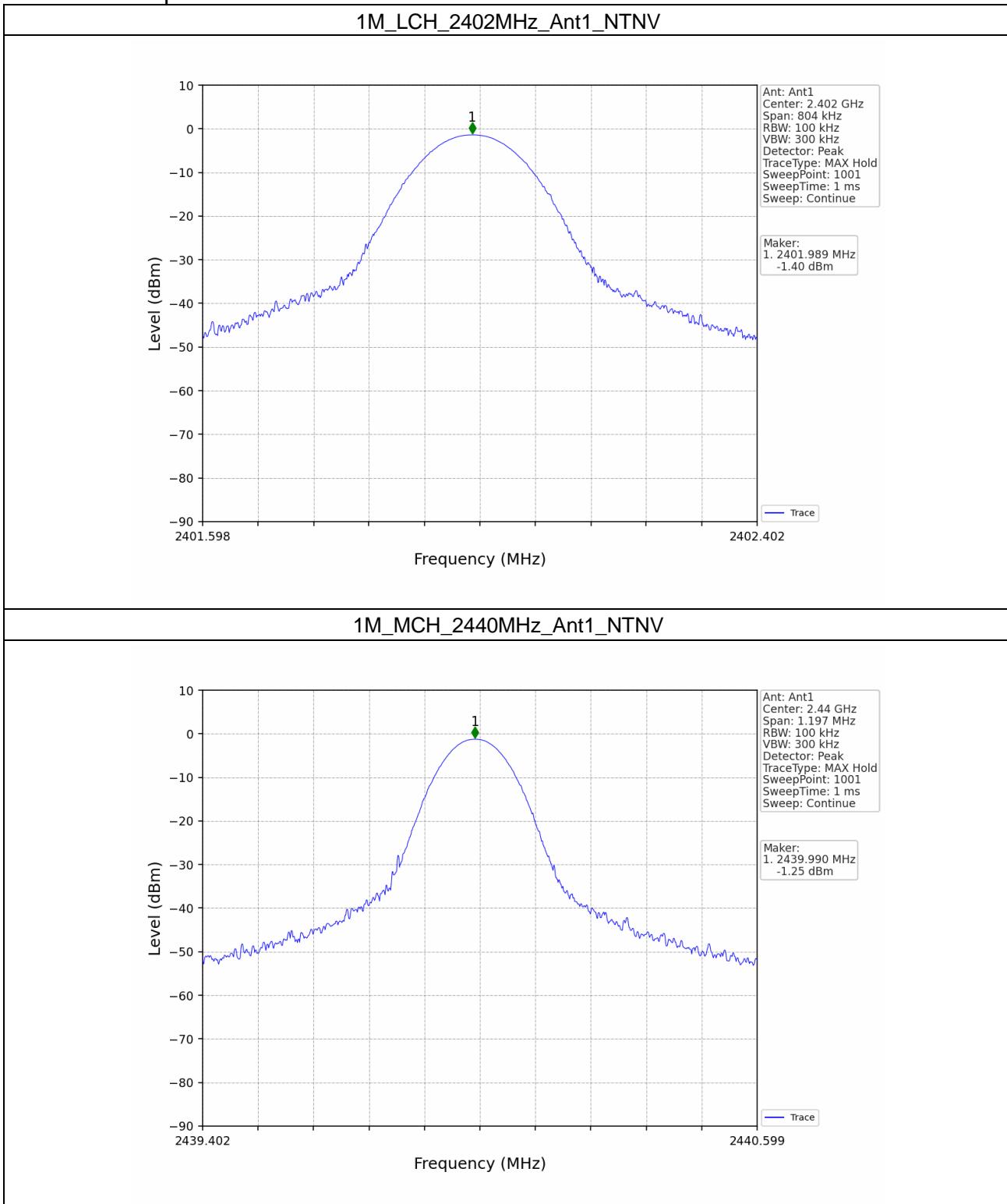


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5.1.2 Test Graph

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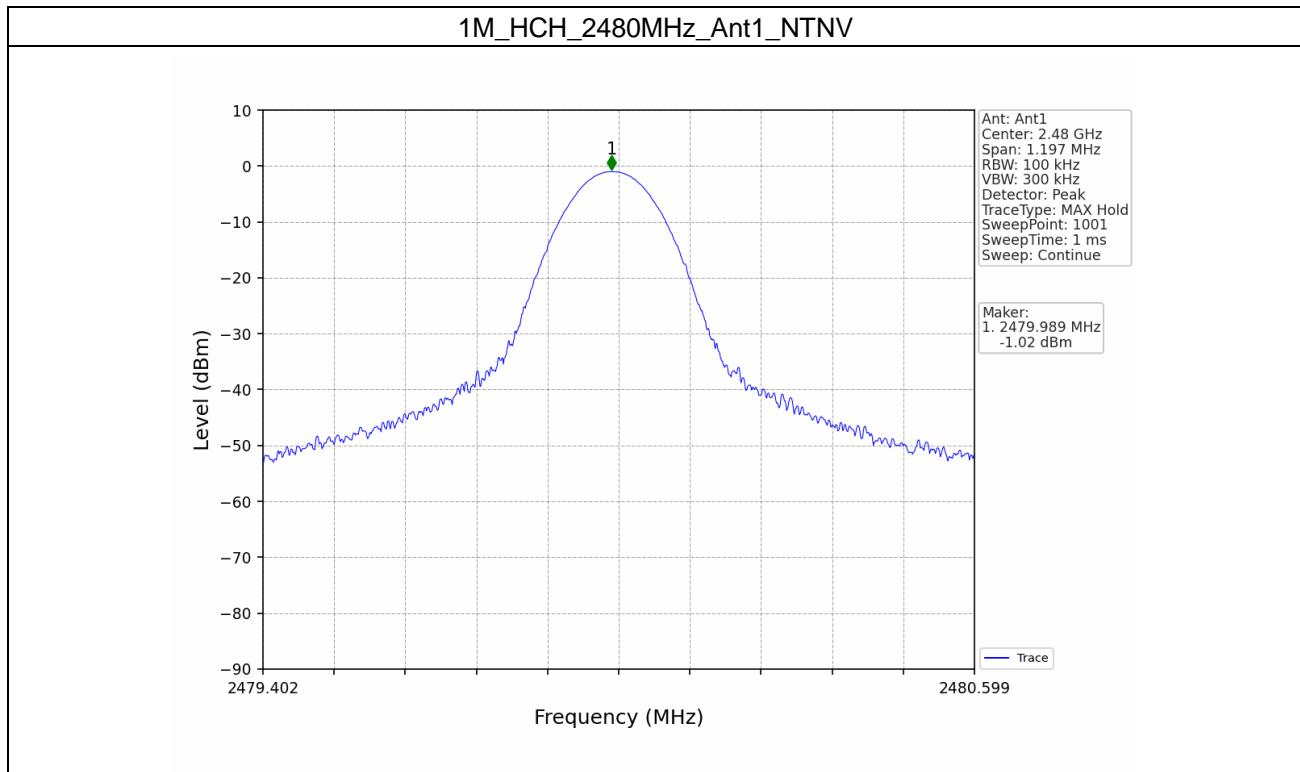
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5.2 CSE**5.2.1 Test Result**

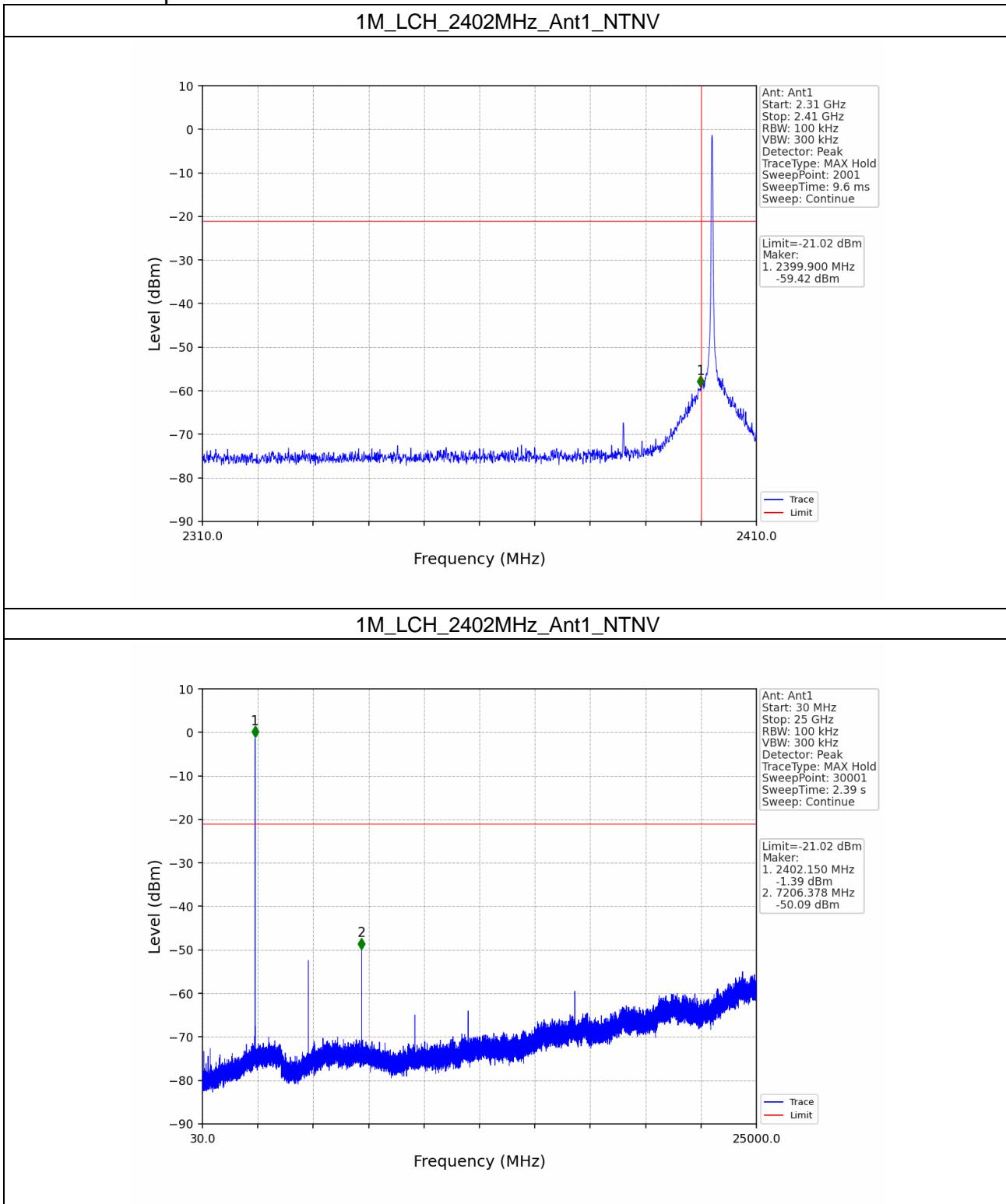
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	-1.02	-21.02	Pass
		2440	1	-1.02	-21.02	Pass
		2480	1	-1.02	-21.02	Pass



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5.2.2 Test Graph

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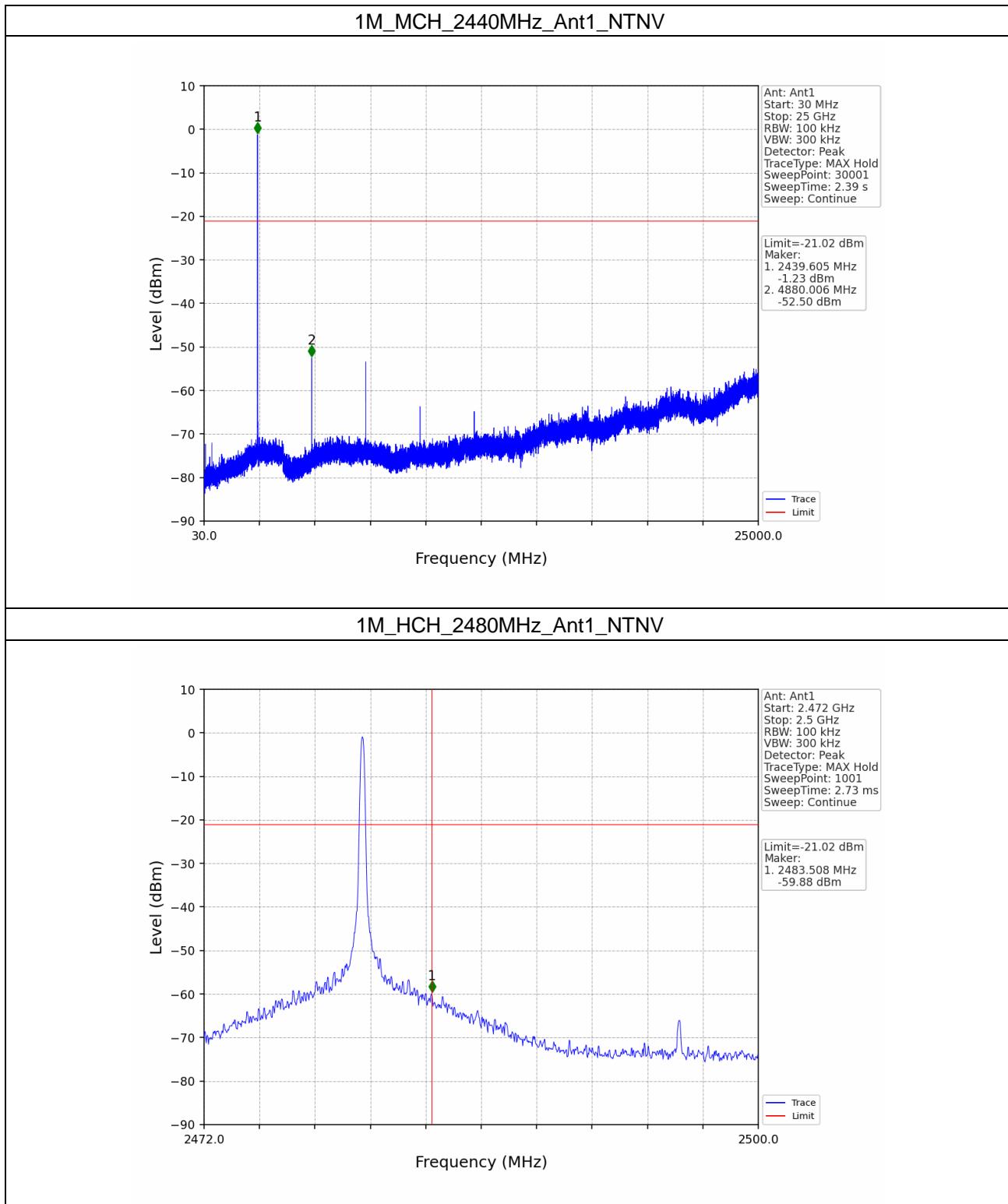
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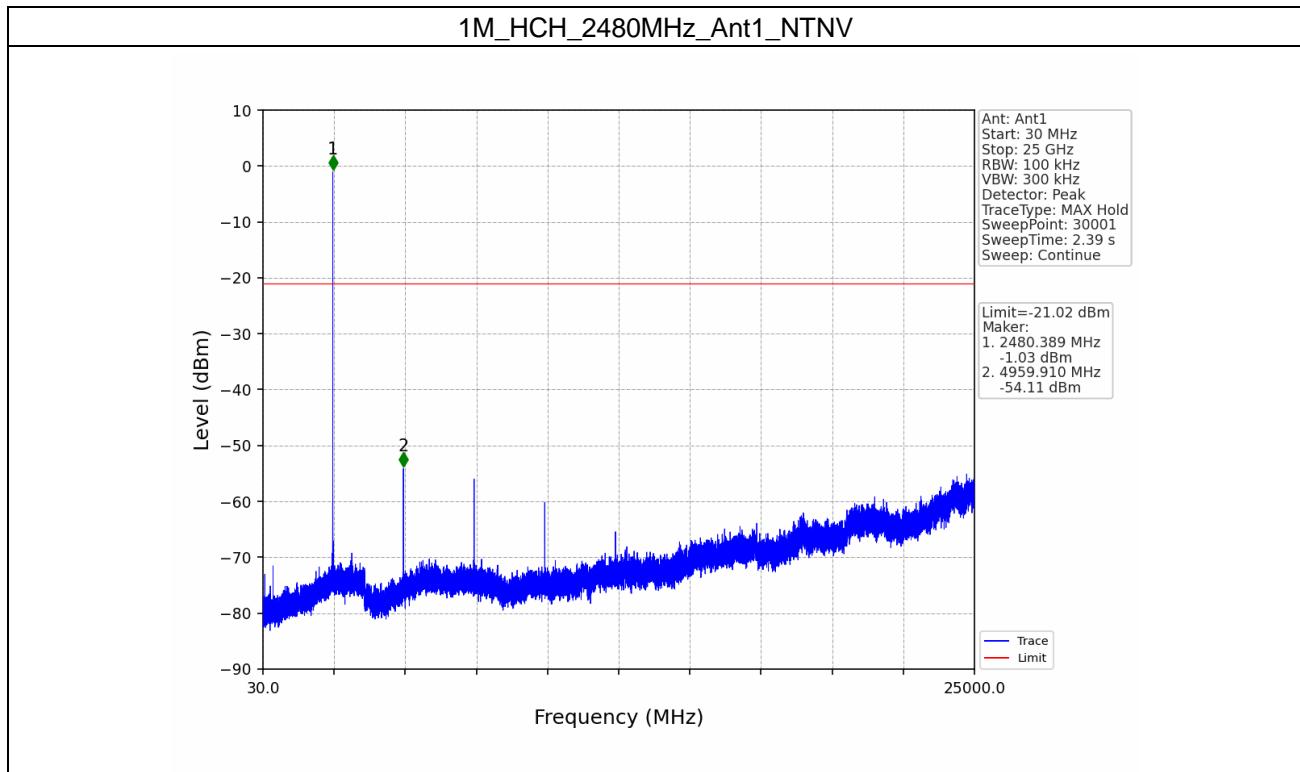
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